RETROSPECTIVE EXPOSURE ESTIMATION AND PREDICTED VERSUS OBSERVED SERUM PERFLUOROOCTANOIC ACID CONCENTRATIONS FOR PARTICIPANTS IN THE C8 HEALTH PROJECT

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Background and Aims: People living or working in eastern Ohio and western West Virginia have been exposed to perfluorooctanoic acid (PFOA) released by the DuPont Washington Works facilities. The specific aim of this work is to estimate historical PFOA exposures and serum concentrations experienced by each of 45,276 non-occupationally exposed participants in the C8 Health Project who consented to share their residential histories.
Methods: Annual PFOA exposure rates were estimated for each individual based on predicted calibrated water concentrations and predicted air concentrations from a previously published environmental fate and transport model, individual residential histories, and default assumptions from the EPA Exposure Factors Handbook. Individual exposure estimates were coupled with a one-compartment pharmacokinetic model to estimate time-dependent serum concentrations.
Results: For all participants (n = 45,276), predicted and observed median serum concentrations in 2005-2006 are 21.6 and 24.3 ppb, respectively (Spearman's rho = 0.67). For participants who provided daily public well water consumption rate and who had the same residence and workplace in one of six municipal water districts for 5 years before the serum sample (n = 785), predicted and observed median serum concentrations in 2005-2006 are 30.3 and 39.3 ppb, respectively (Spearman's rho = 0.83).
Conclusions: Serum PFOA concentrations predicted by linked exposure and pharmacokinetic models are well correlated with observed 2005-2006 human serum concentrations for C8 Health Project participants. These individualized retrospective exposure and serum estimates may be useful for a variety of epidemiologic studies being conducted in this region.